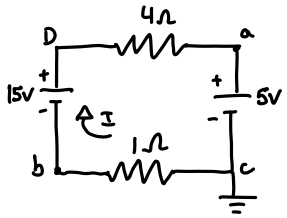
Taylor Larrechea
Dr. Middleton PHYS 132 HW
3-9-17

Ch. 31 P: 26, 62, 64

Problems

31.P.26



$V_a = 5V \quad V_b = -2V$

$a < \Delta V < C \qquad V_a - V_c = 5V \qquad V_c = 0V$

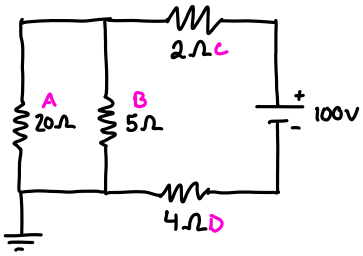
$V_a = 5V$

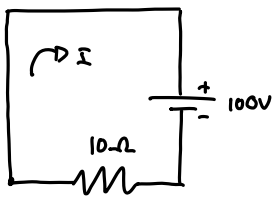
$c < \Delta V < B \qquad V_b - V_c = -IR$

$V_b = -2.0A(1\Omega)$

$V_B = -2V$

31.P.62





$-100V + I(10\Omega) = 0$

$I = 10A$

$R_A + R_B: \quad \frac{1}{R_{AB}} = \frac{1}{R_A} + \frac{1}{R_B}$

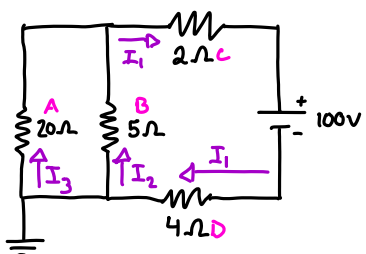
$\frac{1}{R_{AB}} = \frac{1}{20\Omega} + \frac{1}{5\Omega}$

$R_{AB} = 4\Omega$

$R_{AB} + R_C + R_D = R_{eq}$

$4\Omega + 2\Omega + 4\Omega = R_{eq}$

$10\Omega = R_{eq}$



$\Delta V_D: \Delta V_D = I_D R_D \quad \Delta V_D = 40V$

$I_D = 10A$

$R_D = 4\Omega$

$40V + 20V + \Delta V_{AB} = 100V$

$\Delta V_{AB} = 40V$

$\Delta V_C: \Delta V_C = I_C R_C \quad \Delta V_C = 20V$

$I_C = 10A$

$R_C = 2\Omega$

$I_{20\Omega} = 2A$

$I_A: \Delta V_A = IR : I_A = \frac{\Delta V}{R}$

$\Delta V_A = 40V \qquad I_A = 2A$

$R_A = 20\Omega$

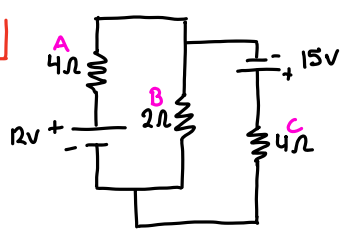
$I_B: I_B = \frac{\Delta V_B}{R_B} \quad I_B = 8V$

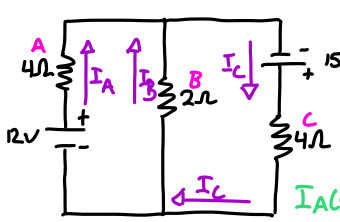
$\Delta V_B = 40V$

$R_B = 5\Omega$

$I_A + I_B = I_C$

31.P.64





$R_A + R_B: \quad 4\Omega + 2\Omega = R_{AB}$

$6\Omega = R_{AB}$

$P_r = I^2 R$

$P_B = I_B^2 R_B \qquad P_B = (\frac{3}{8}A)^2(2\Omega)$

$I_B = \frac{3}{8}A \qquad P_B = 0.28W$

$R_B = 2\Omega$

AB Loop

$12V - I_A(4\Omega) + I_B(2\Omega) = 0$

$-I_A(4\Omega) + I_B(2\Omega) = -12V$

$I_A(4\Omega) - I_B(2\Omega) = 12V$

BC Loop

$15V - I_C(4\Omega) - I_B(2\Omega) = 0$

$I_C(4\Omega) + I_B(2\Omega) = 15V$

$(I_A + I_B)(4\Omega) + I_B(2\Omega) = 15V$

$4\Omega(I_A) + 4\Omega(I_B) + 2\Omega(I_B) = 15V$

$I_A(4\Omega) + I_B(6\Omega) = 15V$

$I_A(4\Omega) - I_B(2\Omega) = 12V$

$I_A(4\Omega) + I_B(6\Omega) = 15V$

$$A = \left[\begin{array}{cc|c} 4 & -2 & 12 \\ 4 & 6 & 15 \end{array}\right] \quad \text{rref}(A) = \left[\begin{array}{cc|c} 1 & 0 & 51/16 \\ 0 & 1 & 3/8 \end{array}\right]$$

$I_A = \frac{51}{16} A$

$I_B = \frac{3}{8} A$

I suck at algebra so here is some linear algebra ☺

$P_{2\Omega} = 0.28W$